

*Dist. mt lightning* was reported as follows: On the 1st in Ill., Iowa, Kan., Mich., Mo., N. H., N. Y., Ohio, Vt., Wis. 2nd, Iowa, Kan., Neb., N. Y., Vt., Fla., Tenn. 3rd, Iowa, Mich., Mo., Tex. 4th, Tex. 5th, Me. 6th, Ind., Kan., Tex. 7th, Tex. 8th, Dak., Iowa, Kan., Neb. 9th, Ind., Wis., Mo. 10th, Md., Pa., Va., Ga. 11th, N. C. 12th, Ill., Ind., Iowa, Kan., Neb. 13th, Ill., Ind., Iowa, Kan., Mich., Tex. 14th, Mich., Tex. 15th, Kan., Tex. 16th, Tex. 19th, Tex. 20th, Ky., Md., Pa. 21st, Md., N. J., Pa., Va., Ohio. 25th, Fla. 26th, Neb. 27th, Neb. 29th, Tex., La. 30th, Tex. 31st, Fla.

*Auroras* were observed on the 1st in Minn.; 2nd, Ill.; 4th, Mich.; 11th, Conn., Ill., Iowa, Mass., N. J., Ind., Mich., Minn., Va., Me., Wis.; 12th, Me.; 15th, Iowa.; 16th, Me.; 18th, Dak.; 26th, Wis.; 27th, Me., N. H.; 30th, N. Y.; 31st, Wis.

## OPTICAL PHENOMENA.

*Solar halos* were observed on the 1st in Ill. 2nd, Ohio. 4th, Mo., R. I. 6th, Ky. 7th, N. Y. 8th, N. H., R. I. 11th, Neb. 12th, Mich., Ohio. 13th, Ohio, Ky. 14th, S. C. 15th, Iowa, N. Y. 16th, Ill., N. Y. 17th, Ind., N. Y., Ohio, Ky. 18th, Ohio. 20th, Me. 21st, Iowa, Me. 23rd, Iowa, N. Y. 24th, Ill., Ind., Iowa, Mich., N. H., N. Y., Ky., R. I. 25th, Ind., N. Y., Ohio, R. I. 28th, Ill. 29th, Ill., Mich., Ohio. 30th, Ill., Ind., Ohio, Ky. 31st, R. I.

*Lunar halos* were observed as follows: On the 10th in Md. 12th, Va. 13th, Mo., N. J., Va., Ga., S. C. 14th, Ind., Mo., Neb., N. Y., Va., Pa. 16th, Ill., Iowa, Kan., Va., Pa. 17th, Ill., Ind., Me., Neb., N. J., N. Y., N. C., Ohio, Pa., Va., Md., Ky. 18th, Mass., N. C., Pa., Tenn. 19th, N. J., N. Y., N. C., Pa., Va., Wis. 20th, Iowa, Va., S. C. 21st, Mich. 23rd, Ill., Iowa, Mo., Neb., Tex., Wis., Mich. 24th, Ind., Ky., Md., N. H., N. J., N. Y., Ohio, Pa., Tex., Va., Ga., S. C., W. Va. 25th, Kan., Ky., W. Va. 26th, Utah, Ky. 27th, Va. 29th, N. Y., Pa. 30th, Ind., Ohio. 31st, N. Y.

*Mirage* was observed on the 8th in Kan. 9th, S. C. 21st, Dak. 22nd, Kan. 29th, Dak. At New London, 14th to 18th, and 25th to 28th.

## MISCELLANEOUS PHENOMENA.

*Burns.*—*Blackbirds* were seen on 7th at Oregon, Mo.; 11th, last seen, Contoocookville, N. H.; flying S., 6th, Palermo, N. Y.; 3d, Wappinger's Falls, N. Y.; 10th, Jacksonburg, Ohio; flying W., on 21st, Austin, Tenn. *Blue jays* going south, 11th, Creswell, Kan.; first seen 21st, Belmont Farm, Texas. *Blue birds* and *Ground Sparrows* last seen on 31st, Contoocookville, N. H. *Blue-birds*, 27th, Palermo, N. Y.; 31st, flying S., Kensico, N. Y.; first seen, 22d, Belmont Farm, Texas. *Buffalo birds*, large flocks going S., 5th, Creswell, Kan. *Crows*, flying S.; 11th, 12th, Geana, Neb.; 26th, Palermo, N. Y. *Cranes*, flying S.; 29th, Baxter Springs, Kan.; 21st, Sedgwick, Kan.; 20th, Emerson, Neb.; 11th, Clear Creek, Neb.; 21st, Belmont Farm, Texas; flying S. W., 20th, Creswell, Kan. *Ducks*, flying N.; 12th, Lower Brule Agency; plentiful, 20th, Farmingdale, N. Y.; flying S., 29th, 30th, 31st, Dayton, Fla.; 2d, Frankford, Mo.; 29th, 31st, Belmont Farm, Texas; 22d, Morgantown, West Va.; numerous, 10th, Oregon, Mo. *Wild ducks* seen on 25th, New Bedford, Mass. *Engles*, flying S., 5th, Sedgwick, Kan. *Geese*, flying S., daily, 3d to 31st, Lower Brule Agency; 31st, Milford, Del.; 21st, Hennepin, Ill.; 29th, Louisville, Ill.; 2d, Elmira, Ill.; 8th, 20th, Milford, Ind.; 31st, Laconia, Ind.; 1st, 20th, Afton, Iowa; 10th, Guttenburg, Iowa; 26th, Cresco, Iowa; 10th, Nora Springs, Iowa; 22d, Tabor, Iowa; 1st, Boonsboro, Iowa; 29th, Baxter Springs, Kan.; 2d, 17th, 19th, 24th, 26th, 28th, 29th, Creswell, Kan.; 18th, 19th, Sedgwick, Kan.; 17th, Independence, Kan.; 26th, Lawrence, Mass.; 23d and 24th, Detroit, Mich.; 22d, Northport, Mich.; 2d, Frankford, Mo.; 20th, Emerson, Neb.; 1st, Plattsmouth, Neb.; 5th, 24th, 28th, 29th, and 31st, and very numerous at Clear Creek, Neb.; 24th, Contoocookville, N. H.; 29th, Oregon, Mo.; 21st, Freehold, N. J.; 27th, Ardemia, N. Y.; 13th, Palermo, N. Y.; 23d, Penn Yan, N. Y.; 21st, 26th, Farmingdale, N. Y.; 26th, Wappinger's Falls, N. Y.; 11th, Bellefontaine, Ohio; 29th, Westchester, Pa.; 22d, Tioga, Pa.; 13th, Franklin, Pa.; 24th, Halmesville, Pa.; 21st and 26th, Austin, Tenn.; 1st, 28th, 31st, Belmont Farm, and numerous 21st, 22d; 27th, Embarrass, Wis.; 21st, 29th, Corsicana, Texas; 10th, Breckenridge, Minn.; 22d, Leavenworth, Kan.; 23d, Vicksburg, Miss.; 29th, Cincinnati, Ohio; 20th, Morgantown, West Va.; flying S. W., 24th, Laconia, Ind.; flying W., 23d, Northport, Mich.; flying W. S. W., 19th, and N. W., 18th, North Volney, N. Y.; numerous 25th, Olivet, Dakota; flying N., 22d, 23d, Waterburg, N. Y.; 3d, Corsicana, Texas; flying N. W., 11th, Montana, Wis.; flying S. E., 2d, Green Castle, Pa.; flying S. S. W., 20th, and S. E. 21st, at Alto Vista, Va. *Humming birds*, last seen on 1st and 3d, Oregon, Mo. *Pelicans*, flying S., 27th, Oregon, Mo. *Robins*, last seen 16th, Creswell, Kan.; 24th, Contoocookville, N. H.; 18th, Palermo, N. Y.; 24th, Penn Yan, N. Y.; departing 7th at West Charlotte, Vt. and entirely disappeared, together with plovers and sparrows, after the 24th. *Swallows*, last seen 13th, Wappinger's Falls, N. Y. *Chimney swallows*, leave Jacksonburg, Ohio, 14th. *Snow-birds*, first seen 20th, Bellefontaine, Ohio; 24th, Bethel, Ohio; 24th, Jacksonburg, Ohio; 25th, Ringgold, Ohio.

*INSECTS.*—*Bees* and *butterflies*, flying about, 23rd, Louisville, Ill.; first seen, 21st, Belmont Farm, Tex.,

*Frogs, grasshoppers and crickets*, singing on 13th and 24th, Oregon, Mo. *Katy-dids*, singing on the 29th, Freehold, N. J.; last heard, 25th, Wappinger's Falls, N. Y. *Hessian fly*, has injured the wheat worse than ever before at Martinsville, Ill.

**BOTANICAL.**—*Osage, orange*, still green, 31st, Vail, Iowa. *Morello Cluny tree*, in bloom on the 14th, Oregon, Mo. *Rose bush*, full bloom, 31st, Belmont Farm, Tex. *Wild mustard*, in blossom on the 31st, Vail, Iowa.

**Polar Bands.**—15th, Southington, Conn.; 2nd, 28th and 30th, St. Mary's Home, Ind.; 1st and 24th, Iowa City, Iowa; 6th, 8th, 27th, 29th and 30th, Tabor, Iowa; 24th, Danville, Ky.; 30th, Gardiner, Me.; 17th, Contoocookville, N. H.; 19th, Auburn, N. H.; 14th, Jacksonburg, Ohio; 30th, Cannonsburg, Pa.; 24th, Woodstock, Vt.; 9th, 17th and 21st, Wytheville, Va.

**Sun-spots.**—The characteristics of the sky, as indicative of approaching fair or foul weather, have been observed daily at all regular Signal Service stations. Reports from 108 stations show 69 blank or doubtful cases; for the remaining 3,112 cases, 2,616 (or 84.2 per cent.) were followed by the anticipated weather.

**Prairie and forest fires or smoke**, daily, from the 6th to the 31st, at Pembina and Lower Brule Agency, Dak.; 28th, Fort Larned, Kan.; 22nd and 23rd, Olivet, Dak.; 4th and 26th to 31st, daily, Creswell, Kan.; 24th and 25th, Somerset, Mass.; 24th, Waltham, Mass.; 12th, 22nd, 23rd, 24th and 31st, Clear Creek, Neb.; 23rd, Genoa, Neb.; 27th, 29th, 30th and 31st, Oregon, Mo.; 17th, Westville, Ohio; 20th to 31st, very extensive near Bismarck, Dak.

**Meteors** were observed on the 1st in Conn., Md., Mass., N. Y.; 2nd, Md., Mass., N. J., N. Y., Ohio, Pa.; 3rd, N. Y., Pa.; 5th, Md., Mass., N. Y.; 6th, Me., S. C.; 7th, Md., N. Y., Idaho; 9th, Mass.; 11th, Md., Mass., N. J.; 13th, Ind., Iowa, N. J.; 13th, Md.; 15th, Ind., Pa.; 16th, Ind., N. Y., Pa.; 17th, N. Y., Vt.; 18th, Minn.; 22nd, Iowa, N. Y.; 23rd, Conn., Kan., Minn., Tex.; 24th, N. J., Ga.; 27th, Ohio; 28th, Ind.; 29th, Iowa; 30th, Conn., La., Me., Md., Pa.; 31st, Ill., Ind., N. Y., Ohio.

**Zodiacal Light.**—30th and 31st, Southington, Conn.; 18th and 19th, in mornings, Daytona, Fla.; 6th, 9th, 11th, 13th to 17th, at St. Mary's Hospital, Ind., and 1st, 5th, 6th, 7th and 28th at Cambridge, Mass.

**Earthquakes** have been noted as follows: on the 12th, quite severe shocks were felt in Oregon, occurring at Portland, at 1:53 p. m.; at Marshfield, Clackamas Co., at 1:45 p. m., and at Cascade City, at 9 a. m. and 1:52 p. m. Shocks were also felt at Hubbard and at points down the Columbia river. The vibrations were from north to south at Portland; several windows were broken and two chimneys thrown down. 3:26 a. m., slight earthquake shock felt all over the Isthmus of Panama. October 9th, 2 a. m., earthquake shocks felt at Lima and Callao; vibrations from north to south, lasting one minute, and at 2:20 a. m., two shocks were felt in Pisco, Ica and Chinchua.

## SOLAR PHENOMENA.

**Sun spots.**—The following observations, made by Mr. D. P. Todd, upon the spots of the sun, have been kindly communicated by Rear Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory:

Oct., 1877.	No. of new—		Disappeared by		Reappeared by		Total number		Remarks.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
2nd, Noon ....	0	0	0	0	0	0	0	0	Large group of faculae.
5th, 11 a. m. ....	0	0	0	0	0	0	0	0	
6th, 11 a. m. ....	0	0	0	0	0	0	0	0	
7th, 2 p. m. ....	0	0	0	0	0	0	0	0	Extensive mottling over the solar surface.
10th, 11 a. m. ....	0	0	0	0	0	0	0	0	
3 p. m. ....	0	0	0	0	0	0	0	0	
5 p. m. ....	0	0	0	0	0	0	0	0	Surface somewhat mottled—"velled spots."
11th, 3 p. m. ....	0	0	0	0	0	0	0	0	
12th, 11 a. m. ....	0	0	0	0	0	0	0	0	
13th, 3 p. m. ....	0	0	0	0	0	0	0	0	Faculae and mottling.
14th, 3 p. m. ....	0	0	0	0	0	0	0	0	
15th, 11 a. m. ....	0	0	0	0	0	0	0	0	
15th, 4 p. m. ....	0	0	0	0	0	0	0	0	{ Largest spot about 25" in diameter; readily visible to the unassisted eye.
16th, 4 p. m. ....	0	0	0	0	0	0	0	0	
17th, 4 p. m. ....	0	0	0	0	0	0	0	0	
18th, 4 p. m. ....	0	0	0	0	0	0	0	0	
22nd, 3 p. m. ....	0	0	0	0	0	0	0	0	
23rd, 11 a. m. ....	0	0	0	0	0	0	0	0	
23rd, 4 p. m. ....	0	0	0	0	0	0	0	0	
31st, 3 p. m. ....	2	30	0	0	0	0	2	30	

Prof. Hinrichs, of Iowa City, reports that the sun was almost free from spots until the 27th, when a spot of very large size appeared, followed by smaller ones in two distinct groups.